January 17, 1986

Dear Manufacturer: CD-86-01 (LD)

SUBJECT: Mass Correction of Dynamometer Quick Check Results for ETW Differences Between Test Vehicles and Coastdown Vehicles

Part 86.129-80 of the regulations allows a vehicle manufacturer to request the use of an alternative dynamometer power absorption (DPA) value, other than the DPA value provided by the EPA regulations, for emissions and fuel economy measurements. Advisory Circular (A/C) Nos. 55A and 55B were issued to provide manufacturers with guidance on an acceptable method of determining road-load power for a vehicle, and to use the determination to generate more accurate DPA values.

One confirmatory test procedure specified by A/C No. 55B is a "quick check," i.e., a comparison of the coastdown time obtained on the dynamometer from test vehicles with the manufacturer's supplied target time obtained from coastdown vehicles. Because coastdown time is sensitive to dynamometer equivalent test weight (ETW) settings, this comparison is valid only if the test vehicle is coasted down at the same ETW as the vehicle that generated the target time. By this letter, we are informing manufacturers that, if a test vehicle is run at a different ETW than the coastdown vehicle which represents it, the quick check results should be "mass corrected" to the weight of the target time.

This notification is being given because not mass correcting quick check results is inaccurate. When a vehicle is tested at a lighter ETW than the coastdown vehicle, the total drag the test vehicle experiences can be artificially reduced without danger of failing an unadjusted quick check. If the ETW is reduced, then the total drag can be reduced proportionally without any increase in the quick check time. Thus, lighter weight vehicles represented by coastdown times generated by heavier vehicles could be made unrepresentatively low in road-load horsepower with little danger of failing the quick

check due to the "extra cushion" provided by its lower weight. This renders less effectual our check of test vehicle representativeness with respect to DPA's.

Part of the reason EPA began the "DPA determination" procedure in 1985 on test waiver requests was to investigate the extent of this problem. The results showed numerous cases when the unadjusted quick check result indicated no problem, but the DPA determination showed that the test vehicle was run with much less total drag than that experienced by the production vehicles it represents. Mass correcting quick check results will help ensure the representativeness of test vehicles.

We note that Section VI.E. of A/C No. 55B states that "since at this time EPA is unable to determine the proper additional correction factor to account for difference in tire deformation, such mathematical corrections will generally not be allowed. . ." However, this is not applicable to quick
checks. Section VI applies only to the use of alternative DPA values and to the establishment of target times and DPA settings. It is not applicable to confirmatory testing, which is covered in Section VII of the A/C. EPA has routinely mass corrected all road confirmation results to the ETW of the original coastdown vehicle. No manufacturer has ever objected

* The quick check is based on the formula F = ma. The "force" we are concerned with is the total drag a production vehicle would experience on the road. The acceleration the vehicle experiences is expressed by the time it takes for the vehicle to slow down from 55 to 45 mph, or:

$$a = \frac{dv}{dt} = \frac{\text{Delta 10 mph}}{\text{Delta t}}$$

The total drag is properly represented by the coastdown time only if the ETW is held constant, as:

$$t \sim 1/a = \frac{M}{F} = \frac{\text{ETW}}{\text{Drag}}$$

Where, v = velocity
t = time
a = acceleration

M = mass
F = force

to this procedure on technical grounds. Further, we have already allowed several manufacturers to mass correct coastdown times to account for changes in ETW when the coastdown group was established.

We will begin mass correcting quick check results for all EPA tests beginning on February 1, 1986. Manufacturers should do the same for all vehicles subject to confirmatory testing by EPA on or after February 1, 1986. The formula to be used is:

Adjusted time =

$$\text{(Actual Quick Check Time)} \times \frac{\text{(ETW of Coastdown Vehicle)}}{\text{(ETW of Test Vehicle)}}$$

The adjusted quick check would then be compared to the target coastdown time for the vehicle.

This practice should not adversely impact the timing of any manufacturer's test program. A manufacturer who has not properly grouped vehicles would have run into trouble with the DPA determination procedure we have recently been applying on a spot check basis. Applying the mass corrected quick check procedure is a much more direct way of screening out unrepresentative or improperly grouped test vehicles. This procedure will be much more expedient for both EPA and the manufacturers to run and will better provide for manufacturers to self-police themselves, thus averting some disruption resulting from the last minute discovery of discrepancies by EPA as occurred last year.

This will also apply to carryover of data from one model year to the next. Data cannot be carried over unless it passes the quick check criteria when mass corrected and compared to the new model year's target times.

If there are any questions about this matter, please contact your certification team.

Sincerely yours,

Robert E. Maxwell, Director
Certification Division
Office of Mobile Sources